

The endemic species of *Conus* from Angola. 2. Description of three new species

Los *Conus* endémicos de Angola. 2. Descripción de tres nuevas especies

Emilio ROLÁN* and Dieter RÖCKEL**

Recibido el 22-III-2001. Aceptado el 11-VIII-2001

ABSTRACT

Three new species of the genus *Conus* from Angola are described. The morphological characters of the shell and radula are shown, making comparisons with other similar species from the studied area.

RESUMEN

Se describen tres nuevas especies del género *Conus* procedentes de Angola. Se muestran las características morfológicas de la concha y diente radular comparándolas con otras especies similares del área de estudio.

KEY WORDS: Conidae, *Conus*, new species, Angola.

PALABRAS CLAVE: Conidae, *Conus*, especies nuevas, Angola.

INTRODUCTION

The Angolan *Conus* have been revised recently by ROLÁN AND RÖCKEL (2000). In this work all the previous studies on this group were mentioned and listed in the introduction and the references were included.

Some other populations were being studied at the same time as those published in 2000 but were unable to be finished at that time due to the sudden death of Francisco Fernandes. Francisco was the person who knew most about this group and had collected many samples in most locations on the Angola coast. Now we have had the time and more information to conclude that there are three populations, presented herein, that we consider to be new taxa.

Abbreviations:

AMNH American Museum of Natural History, New York
BMNH The Natural History Museum, London
MNCN Museo Nacional de Ciencias Naturales, Madrid
MNHN Muséum National d'Histoire Naturelle, Paris
SMNS Staatliches Museum für Naturkunde, Stuttgart
USNM The National History Museum, Washington
CDR collection Dieter Röckel, Eberbach, Neckar
CER collection Emilio Rolán, Vigo
CFF collection Francisco Fernandes, Cacelas

* Cánovas del Castillo 22, 36202 Vigo, Spain. E-mail: emiliorolan@inicia.es

** Neckaranlage, 6, D-69412 Eberbach/Neckar, Germany. E-mail: D.Roeckel@t-online.de

CGR collection Gabriella Raybaudi Mas-silia, Roma
 CMF collection Michael Filmer, Chobham
 CPR collection Peter Ryall, Takoradi
 D Number of denticles in serration
 DR/PA Total length of the radula tooth/apical portion
 F Blade of radula tooth
 L Shell length
 LC/DR Length of the shell/length of the radula tooth
 ND Number of teeth in the radula
 %PA Extension of the apical portion covered by the blade of radula tooth (F) ($100 \times F/PA$)

PMD Position of maximum diameter of last whorl = height of maximum diameter/aperture height.
 RD Relative diameter of last whorl = maximum diameter/aperture height
 RSH Relative spire height, as proportion of shell length = height of maximum diameter/aperture height.
 RW Relative weight of the shell = absolute weight/L
 S Serration
 j juvenile
 s shells
 sp specimen(s) with soft parts

RESULTS

Conus tenuilineatus n. sp. (Figs. 1-6, 21)

Conus sp. Röckel, 1988. *Club Conchylia*, 1988: 4-5, pl. 2 fig. 14.

Conus sp. Röckel and Fernandes, 1982. *La Conchiglia*, 14 (164-165): 18, fig. 34.

Type material: Holotype (Figs. 1-2) in MNCN (15.05/44374) 26.7 × 14.5 mm. Paratypes (sp) in the following collections: MNHN (1), SMNS (1), CDR (2), CER (3), CGR (1), CMF (1) and CPR (1), all from type locality.

Other material studied: Angola: 2 s, Baía do Binga (CER); 1 s, Baía do Canoco (SMNS); 3 sp, Baía de Santa Maria (SMNS); 2 sp, Caota (Benguela) (CER); 9 sp, Caota (Benguela), 1-3 m (CER); dubious material: 13 sp, Piambo (CER).

Type locality: Baía do Binga, Angola.

Etymology: The name is derived from the shell-pattern.

Shell description: Small to moderately small, moderately solid. Last whorl ventricosely conical. Outline convex at adapical third, almost straight below. Aperture slightly wider at base than near shoulder. Shoulder subangulate. Spire of low to moderate height, outline usually slightly convex. Teleoconch sutural ramps convex, with numerous spiral striae. Last whorl smooth and dull, with some broad and weak spiral grooves at base.

Ground colour of shell white or light brown tinted with numerous wavy or straight, brown, close-set (10/cm up to 40/cm) hair-lines from spire to base, flowing together at shoulder and base, occasionally punctated and forming traces of a spiral-band at the central area. Base dark brown, aperture white. Specimens from Santa Maria and

Canoco may have light bluish-white ground colour and a light violet aperture with two white bands at centre and shoulder.

Periostracum: Brown, transparent.

Shell morphometry:

L 18-29 mm

RD 0.54-0.61

RSH 0.09-0.14

PMD 0.76-0.82

RW 0.09-0.14 g/mm

Description of the animal: Animal not available for study although the radula was obtained from dry soft parts.

Radula: In radula sac 48-58 teeth. Tooth of a vermivorous type, relatively wide (Fig. 21). PA scarcely larger than half DR; S narrow, with only a single row of D, which are about 20 in number, being free of them on its upper part. F is covering near 80%.

Radula morphometry: (n=4)

D 19-21

ABS 30-40°

LC/DR 38-43

DR/PA 1.93-1.98

Distribution: Baía do Binga, Baía de Canoco, Baía de Santa Maria, Benguela, and Caota. The affiliation of the specimens from Piambo to *C. tenuilineatus* is questionable.

Habitat: 1-3 m, buried in sand under stones. *C. tenuilineatus* lives sympatrically with *C. bulbosus*, *C. neoguttatus*, *C. variegatus*, *C. carnalis*, *C. zebroides*, *C. nobreii*, *C. musivus*, *C. naranjus*, *C. albuquerquei*, *C. micropunctatus*, and *C. trovaoui*.

Discussion: The specimens of *C. tenuilineatus* from Canoco and Santa Maria differ from the typical specimens in their slightly violet ground colour as well as in the violet colored inside of the aperture. Those from Caota may have the axial lines less evident. We consider all them local variants of the same species. The specimens from Piambo show certain similarities in shell pattern, but their taxonomical status remains doubtful, considering their living space is far from the typical specimens; we cannot exclude the possibility that they belong to another species.

C. tenuilineatus is similar to the sympatric living *C. zebroides* in its colour-pattern. The latter species has a larger size (28-51 mm vs. 18-29 mm) and a broader last whorl (0.64-0.70 vs. 0.54-0.61). The axial pattern of *C. zebroides* is composed of distant instead of close-set uninter-

rupted axial streaks instead of hairlines. The tooth of *C. zebroides* (see ROLÁN AND RÖCKEL, 2000, fig. 124) is more elongate, relatively smaller (LC/DR 51-97 vs. 38-53), narrower and its DR/PA higher (2.0-3.6 vs. 1.93-1.98) (see Figure 26).

Other similar species are *C. naranjus* and *C. cepasi*. *C. naranjus* can be distinguished by its different shape (RD 0.62-0.69 vs. 0.54-0.61, PMD 0.68-0.76 vs. 0.76-0.82), the orange colour and the pattern, consisting of punctated axial lines. *C. cepasi* has – like *C. naranjus* – a broader RD (0.64-0.70 vs. 0.54-0.61) and a smaller PMD (0.68-0.77 vs. 0.76-0.82), has a larger size (up to 50 mm), and an orange colour. *C. naranjus* and *C. cepasi* additionally differ in the shape of radula tooth (see ROLÁN AND RÖCKEL, 2000, figs. 128 and 132-133): *C. cepasi* and *C. naranjus* have radular teeth more primitive and smaller in size. In *C. tenuilineatus* the apical portion is covered by the blade of radula tooth at 77.2%, in *C. naranjus* and *C. cepasi* the apical portion is completely uncovered (%PA = 0). Also the radular teeth are different in other characters, particularly in LC/DR proportion: *C. tenuilineatus*: 40 vs. *C. cepasi*: 94 and vs. *C. naranjus*: 73 (see the graphic comparison of some characters of the radular teeth in Figure 27).

Somewhat closer but still different is the radula tooth of *C. micropunctatus* (see ROLÁN AND RÖCKEL, 2000, fig. 139). But the latter, living sympatrically in Canoco, differs conspicuously in shell morphometry and shell pattern and cannot be confused with *C. tenuilineatus*.

Conus anabelae n. sp. (Figs. 7-12, 22, 25)

Conus sp. Röckel, 1988. *Club Conchylia Informationen*, 1988 (4-5): pl. 2, fig. 16.

Type material: Holotype (Figs. 7-8) in MNCN (15.05/44375) 23.3 x 15.1 mm. Paratypes in MNHN (1), AMNH (1), BMNH (1), SMNS (1), CDR (2), CGR (1), CER (17), CMF (1) and CPR (1), all from the type locality.

Other material studied: Angola: 36 sp, Praia Amelia, 3-6 m (CFF); 47 sp, 17 j, Praia Amelia 3-6 m (CER); 8 sp, Praia Amelia, 15-20 m (CER); 5 sp, Ponta de Noronha, Baía de Moçamedes (CER); 12 sp, Ponta de Noronha (SMNS); 14 sp, Praia Amelia, Baía de Moçamedes (SMNS); 3 sp, Praia das Conchas, Baía de Moçamedes (SMNS).

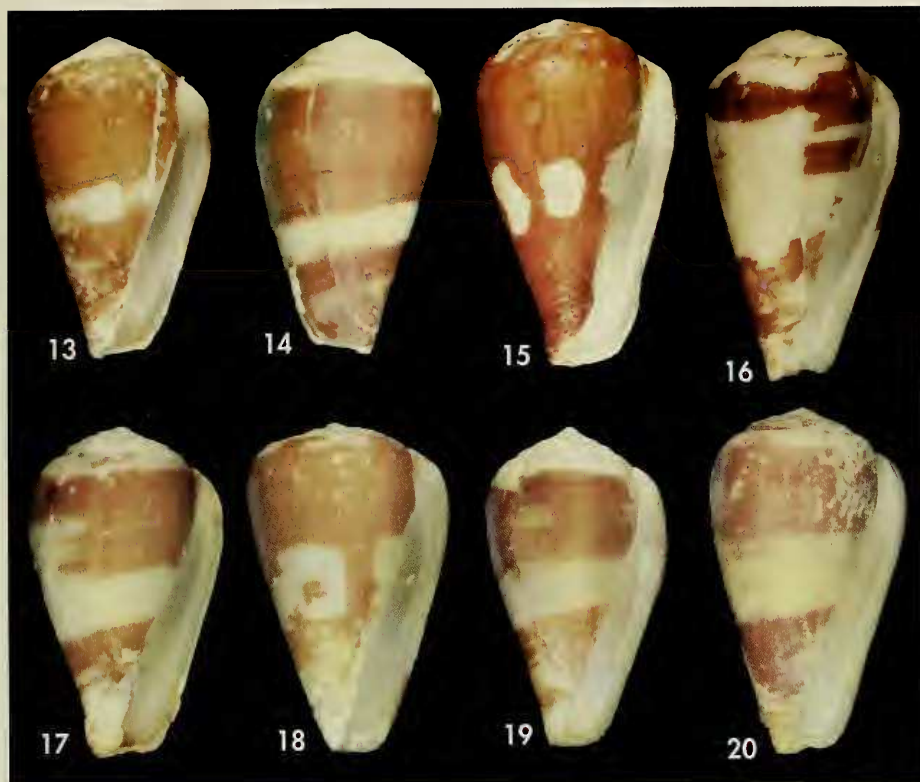
Type locality: Praia Amelia, in the Baía de Moçamedes.

Etymology: Named in honour of Anabela, daughter of Francisco Fernandes. Both, Anabela and Francisco, collected the material here described.



Figures 1-6. *Conus tenuilineatus*. 1, 2: holotype, 26.7 mm, Baía do Binga (MNCN); 3: paratype, 25.5 mm, Baía do Binga (MNHN); 4: shell, 21.0 mm, Baía do Canoco (CER); 5: paratype, 20.6 mm, Baía do Binga (CER); 6: paratype, 21.1 mm, Baía do Binga (CPR). Figures 7-12. *Conus anabelae*. 7, 8: holotype, 23.3 mm, Praia Amelia (MNCN); 9: paratype, 31.6 mm, Praia Amelia (MNHN); 10: paratype, 25.0 mm, Praia Amelia (AMNH); 11: paratype, 27.8 mm, Praia Amelia (CPR); 12: paratype, 26.2 mm, Praia Amelia (BMNH).

Figuras 1-6. Conus tenuilineatus. 1, 2: holotipo, 26,7 mm, Baía do Binga (MNCN); 3: paratipo, 25,5 mm, Baía do Binga (MNHN); 4: concha, 21,0 mm, Baía do Canoco (CER); 5: paratipo, 20,6 mm, Baía do Binga (CER); 6: paratipo, 21,1 mm, Baía do Binga (CPR). Figuras 7-12. Conus anabelae. 7, 8: holotipo, 23,3 mm, Praia Amelia (MNCN); 9: paratipo, 31,6 mm, Praia Amelia (MNHN); 10: paratipo, 25,0 mm, Praia Amelia (AMNH); 11: paratipo, 27,8 mm, Praia Amelia (CPR); 12: paratipo, 26,2 mm, Praia Amelia (BMNH).



Figures 13-20. *Conus babaensis*. 13-14: holotype, 25.8 mm, Baía do Baba (MNCN); 15: paratype, 34.1 mm, Baía do Baba (CER); 16: paratype, 34.5 mm, Baía do Baba (CER); 17: paratype, 28.0 mm, Baía do Baba (AMNH); 18: paratype, 29.3 mm, Baía do Baba (MNHN); 19: paratype, 21.9 mm, Baía do Baba (CER); 20: paratype, 35.1 mm, Baía do Baba (CER).

Figures 13-20. Conus babaensis. 13-14: holotipo, 25,8 mm, Baía do Baba (MNCN); 15: paratipo, 34,1 mm, Baía do Baba (CER); 16: paratipo, 34,5 mm, Baía do Baba (CER); 17: paratipo, 28,0 mm, Baía do Baba (AMNH); 18: paratipo, 29,3 mm, Baía do Baba (MNHN); 19: paratipo, 21,9 mm, Baía do Baba (CER); 20: paratipo, 35,1 mm, Baía do Baba (CER).

Shell description: Small to moderately small, moderately light to moderately solid. Last whorl ventricosely conical. Outline convex at adapical third, slightly concave below. Aperture wider at base than near shoulder. Shoulder subangulate to rounded. Spire low, outline straight or slightly convex. Teleoconch sutural ramps convex,, with numerous spiral striae. Last whorl smooth and dull, with some broad and weak spiral grooves at base.

Ground colour light brown, changing to darker and lighter zones, spiral bands or spiral lines. Usually darker brown

near base and often with a lighter brown broad spiral-band at centre or above centre. Lighter zones with very close-set axial brown lines. Aperture white.

Periostacum: Brown, transparent.

Shell morphometry:

L 18-29 mm

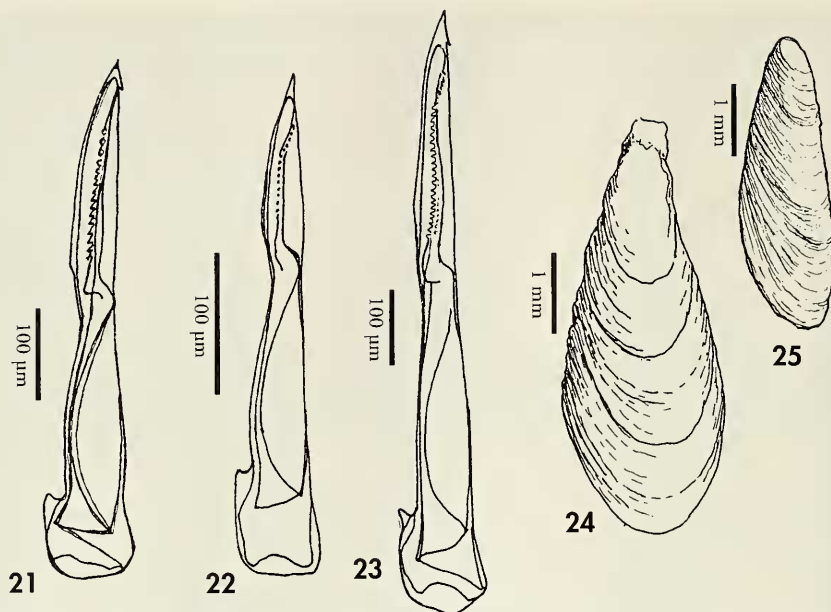
RD 0.66-0.73 (specimens of Praia das Conchas: 0.75-0.78)

RSH 0.07-0.14

PMD 0.76-0.80

RW 0.09-0.21

Description of the animal: Animal not available for study although the radula was obtained from dry soft parts.



Figures 21-23: Radular teeth. 21: *Conus tenuilineatus*, sp of 25.4 mm, Baía Binga; 22: *C. anabelae*, sp of 20.2 mm, Ponta de Noronha; 23: *C. babaensis*, sp of 35.4 mm, Baía da Baba. Figures 24, 25. Operculum. 24: *C. babaensis*, sp of 22.1 mm; 25: *C. anabelae*, sp of 22.2 mm.

Figuras 21-23: Dientes radulares. 21: Conus tenuilineatus, sp de 25,4 mm, Baía Binga; 22: C. anabelae, sp de 20,2 mm, Ponta de Noronha; 23: C. babaensis, sp de 35,4 mm, Baía da Baba. Figuras 24, 25. Opérculos. 24: C. babaensis, sp de 22,1 mm; 25: C. anabelae, sp de 22,2 mm.

Radula: In radula sac 70-100 teeth. Tooth of vermivorous type, relatively primitive (Fig. 22). PA shorter than half of DR; S narrow, with about 15 D in a single row, being present on its upper part; F covering near 80% of PA.

Radula morphometry: (n = 9)

D 13-20

ABS 45°

LC/DR 52-60

DR/PA 2.09-2.25

%PA 70-76

Habitat: Shallow water, under rocks, buried in sand. *C. anabelae* is sympatric with *C. filmeri* and *C. fuscolineatus*.

Distribution: Found in several localities around Baía de Moçamedes (Praia Amelia, Ponta de Noronha, Praia das Conchas).

Discussion: Specimens from Praia das Conchas differ from the typical specimens conspicuously by their larger relative diameter (0.75-0.78 vs. 0.66-

0.73). As all other characters are identical, we consider the population of Praia das Conchas to be a geographical variant of *C. anabelae*.

C. anabelae is most similar to *C. babaensis* (see below) in shell characters, but can be distinguished by its brown instead of white ground colour. While the pattern of *C. anabelae* merges from lighter to darker brown, in *C. babaensis* brown and white bands and flecks are clearly separated. The tooth of *C. anabelae* is rather different from the tooth of *C. babaensis* (see Figs. 22 and 23-25), firstly in the ratio DR/PA (2.09-2.25 vs. 1.71-2.09) which conspecificity excludes. In addition, *C. anabelae* has about 50% more teeth in the radula (70-100 vs. 48-62) and more D in S (29 vs. 15) (see Figure 28). Most similar - although not identical - in radula shape is the sympatrically living *C. filmeri*, but the latter can easily be distinguished by its different shell characters (shell shape and

Table I. Distribution of the known species of endemic *Conus* in Angola. 1: Luanda area (Praia Santiago, Cacuaco, Corimba, Farol das Lagostas, Baía de Mussulo, Barra de Cuanza).; 2: Lobito; 3: Benguela (Sombreiro, Caotinha, Caota, Baía Azul, Baía Farta); 4: Cuio, Baía de Equimina, Ponta Campeona, Baía dos Elefantes, Piambo; 5: Baía dos Limagens; 6: Baía do Binga; 7: Meva, Baía do Canoco, Baía de Santa Maria; 8: Bonfim, Baía da Bissonga, Baía da Lucira, Baía do Cesar, Doca, Capato, Calonga.; 9: São Nicolau, Bentiaba; 10: Baía das Salinas; 11: Chapéu Armado; 12: Calungo; 13: Piambo; 14: Baía do Baba; 15: Baía do Mocuio; 16: Baía das Pipas; 17: Charungo, Praia das Conchas; 18: Baía do Saco Mar (do Saco), Baía de Moçamedes, Ponta de Noronha, Praia Amélia.; 19: Ensenada dos Tres Irmãos; 20: Pinda, Porto Alexandre, Ponta Albina; 21: Baía dos Tigres.

Tabla I. Distribución de las especies de *Conus* endémicos de Angola. 1: Luanda area (Praia Santiago, Cacuaco, Corimba, Farol das Lagostas, Baía de Mussulo, Barra de Cuanza).; 2: Lobito; 3: Benguela (Sombreiro, Caotinha, Caota, Baía Azul, Baía Farta); 4: Cuio, Baía de Equimina, Ponta Campeona, Baía dos Elefantes, Piambo; 5: Baía dos Limagens; 6: Baía do Binga; 7: Meva, Baía do Canoco, Baía de Santa Maria; 8: Bonfim, Baía da Bissonga, Baía da Lucira, Baía do Cesar, Doca, Capato, Calonga.; 9: São Nicolau, Bentiaba; 10: Baía das Salinas; 11: Chapéu Armado; 12: Calungo; 13: Piambo; 14: Baía do Baba; 15: Baía do Mocuio; 16: Baía das Pipas; 17: Charungo, Praia das Conchas; 18: Baía do Saco Mar (do Saco), Baía de Moçamedes, Ponta de Noronha, Praia Amélia.; 19: Ensenada dos Tres Irmãos; 20: Pinda, Porto Alexandre, Ponta Albina; 21: Baía dos Tigres.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|--------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|
| <i>C. aemulus</i> | • | | | | | | | | | | | | | | | | | | | | |
| <i>C. africanus</i> | | | | | | | | | • | | | | | | | | | | | | |
| <i>C. albuquerquei</i> | | | | | | | • | | | | | | | | | | | | | | |
| <i>C. anabelae</i> | | | | | | | | | | | | | | | | | | • | | | |
| <i>C. babaensis</i> | | | | | | | | | | | | | | • | | • | | | | | |
| <i>C. bocagei</i> | | • | | | | | | | | | | | | | | | | | | | |
| <i>C. bulbus</i> | | | • | | | • | • | | | | | | | | | | | | | | |
| <i>C. carnalis</i> | | | | • | | • | • | | | | | | | | | | | | | | |
| <i>C. cepasi</i> | | | | | | | | | • | | • | | | | | | | | | | |
| <i>C. chytreus</i> | | | | • | • | | | • | | • | | | | | | | | | | | |
| <i>C. filmeri</i> | | | | | | | | | | | | | | | | | | • | | | |
| <i>C. flavus albus</i> | | | | | | | | | | | | | | | | • | | | | | |
| <i>C. franciscoi</i> | | | | | | | | | • | | • | | | | | | | | | | |
| <i>C. fuscolineatus</i> | | | | | | | | | • | | • | | | • | • | • | | • | • | | |
| <i>C. gabrielae</i> | | | | | | | | | • | | • | | | | | | | | | | |
| <i>C. micropunctatus</i> | | | • | • | | • | • | | | | | | | | | | | | | | |
| <i>C. musivus</i> | | | | • | | | • | | | | | | | | | | | | | | |
| <i>C. naranjus</i> | | | • | | | | • | • | | | | | | | | | | | | | |
| <i>C. neoguttatus</i> | | | | • | | | • | | | | | | | | | | | | | | |
| <i>C. nobrei</i> | | | | | | | • | • | | | | | | | | | | | | | |
| <i>C. tenuilineatus</i> | | | • | | | • | • | | | | | | | | | | | | | | |
| <i>C. trovaoi</i> | | | | • | | | | • | | | | | | | | | | | | | |
| <i>C. variegatus</i> | | | | • | | | • | • | | | | | | | | | | | | | |
| <i>C. xicoi</i> | • | | | | | | | | | | | | | | | | | | | | |
| <i>C. zebroides</i> | | | • | • | • | • | • | • | • | | • | | | | | | | | | | |

white colour pattern). Both species appear very similar when the periostracum is not removed.

The radula tooth is also different from other species of superficial similarity: *C. flavusalbus*, *C. africanus* and *C.*

naranjus (see Figures 29, 30). On the other hand, *C. bulbosus* has obvious different shell characters, while the radular characters are similar, except the number of teeth in radula sac (*C. anabellae* 70-100 vs. 58-63).

Conus babaensis n. sp. (Figs. 13-20, 23, 24)

Type material: Holotype (Figs. 13-14) in MNCN (15.05/44376) 25.8 x 15.7 mm; paratypes in AMNH (1), BMNH (1), MNHN (1), SMNS (1), USNM (1), CDR (2), CGR (1), CER (20), CMF (1) and CPR (1), all from the type locality.

Other material examined: Angola: 36 sp, Baía do Baba, 1-3 m (CFF); 20 sp, Baía do Baba, 1-3 m (CER)

Type locality: Baía do Baba, Province of Namibe, Angola.

Etymology: The name derives from the type locality.

Shell description: Small to moderately small, moderately solid. Last whorl ventricosely conical to broadly ovate. Outline convex at apical third, almost straight below. Left side concave near base. Aperture slightly wider at base than near shoulder. Shoulder rounded. Spire of low to moderate height, outline convex, slightly sigmoid near apex. Teleoconch sutural ramps slightly convex, with fine spiral striae. Last whorl smooth but not glossy, with some weak spiral ribs near base.

Ground colour white. Last whorl with two light brown, broad spiral bands, leaving a white spiral band of varying extent below centre and a white base. The brown areas often show irregular darker brown spiral lines. Spire usually white with brown lines along suture, occasionally with irregular brown flecks. Aperture white.

Periostracum: Light brown, somewhat transparent.

Shell morphometry:

L 17-32 mm

RD 0.67-0.71

RSH 0.09-0.14

PMD 0.70-0.78

RW 0.09-0.19 g/mm

Description of the animal: Animal not available for study although the radula was obtained from dry soft parts.

Radula: In radula sac 48-78 teeth. Tooth of a vermivorous type, narrow and elongate (Fig. 23). PA larger than

half DR, except in very juvenile specimens; S narrow, with about 33 in a single row of D, being present on its upper part. F covering near 80%.

Radula morphometry: (n = 12)

D 27-38

ABS 45-50°

LC/DR 40-55

DR/PA 1.71-2.09

%PA 51-74

Habitat: Shallow water under rocks buried in sand. *C. babaensis* lives sympatrically with *C. flavusalbus*, and *C. fuscolineatus*.

Distribution: Found in Baía do Baba and Baía das Pipas, Province of Namibe, Angola.

Discussion: *Conus babaensis* is a typical member of the endemic cones of Angola (being small sized, with rounded shoulders and a smooth and dull surface), but can be distinguished from all others by its colour-pattern.

Most similar in size and shell shape are *C. anabellae* - living in the adjoining area of Moçamedes - and *Conus chytreus* Melvill. *C. anabellae* can be distinguished by its colour pattern, in particular by the very different characters of its radular tooth. For comparison, see the Discussion of the latter species and the Figure 28.

C. chytreus and *C. bulbosus* have a similar radula morphometry. However, *C. chytreus* differs in the number of D in S (*C. chytreus* 17-26 vs. 27-38) and in its

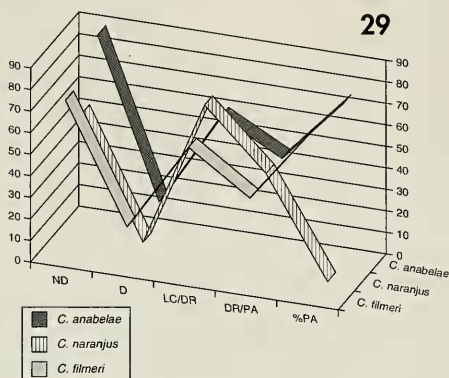
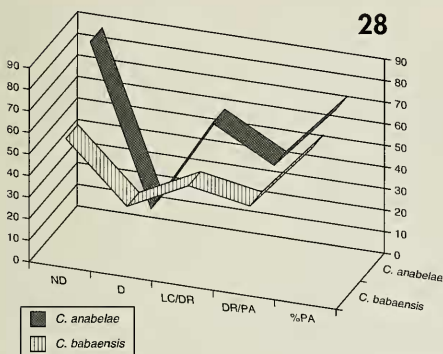
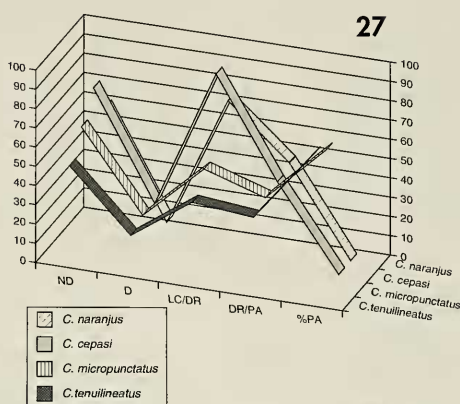
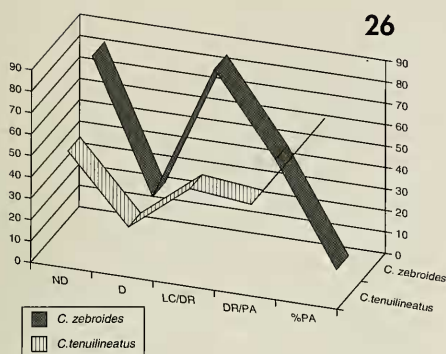


Figure 26. Comparison of some radula teeth characters of *Conus zebroides* and *C. tenuilineatus*. Figure 27. Comparison of some radula teeth characters of *Conus naranjus*, *C. cepasi*, *C. micropunctatus* and *C. tenuilineatus*. Figure 28. Comparison of some radula teeth characters of *Conus anabelae* and *C. babaensis*. Figure 29. Comparison of some radula teeth characters of *Conus anabelae*, *C. naranjus* and *C. filmeri*.

Figure 26. Comparación entre algunos caracteres radulares de *Conus zebroides* y *C. tenuilineatus*. Figura 27. Comparación entre algunos caracteres radulares de *Conus naranjus*, *C. cepasi*, *C. micropunctatus* y *C. tenuilineatus*. Figura 28. Comparación entre algunos caracteres radulares de *Conus anabelae* y *C. babaensis*. Figura 29. Comparación entre algunos caracteres radulares de *Conus anabelae*, *C. naranjus* y *C. filmeri*.

shell characters: its dark reddish brown colour of pattern, composed of spiral lines, the lack of a white central band, and the dark brown coloured spire. *C. bulbus* has – apart from small differences in morphometry – an obviously different colour pattern (compare Figures 2-6 in ROLÁN AND RÖCKEL, 2000). *C. bulbus* lives far from *C. babaensis*. For the radula teeth characters see Figure 31.

C. filmeri Rolán and Röckel, 2000, may have apparently the most similar

radular tooth (different in DR/PA of 2.1-2.3 vs. 1.71-2.09), but differs clearly in shell morphometry and colour-pattern (pure white), so conspecificity cannot be assumed.

The tooth of *C. babaensis* is very different from those of *C. flavusalbus*, *C. naranjus*, and *C. africanus*. The latter two species are from the north of the Cuanzo River, while *C. babaensis* occurs in the distant places of Baía do Baba and Baía das Pipas (Figures 31, 32).

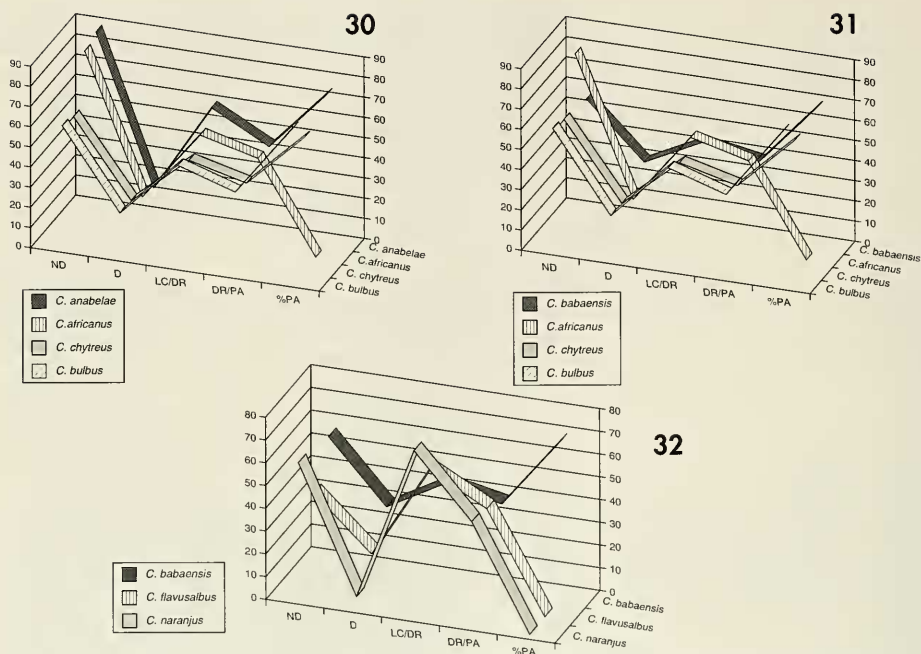


Figure 30. Comparison of some radula teeth characters of *Conus anabetae* with those of *C. africanus*, *C. chyturus* and *C. bulbus*. Figure 31. Comparison of some radula teeth characters of *Conus babaensis* with those of *C. africanus*, *C. chyturus* and *C. bulbus*. Figure 32. Comparison of some radula teeth characters of *Conus babaensis* with those of *C. flavusalbus* and *C. naranjus*.

Figura 30. Comparación entre algunos caracteres radulares de *Conus anabetae* con los de *C. africanus*, *C. chyturus* y *C. bulbus*. Figura 31. Comparación entre algunos caracteres radulares de *Conus babaensis* con los de *C. africanus*, *C. chyturus* y *C. bulbus*. Figura 32. Comparación entre algunos caracteres radulares de *Conus babaensis* con los de *C. flavusalbus* y *C. naranjus*.

FINAL COMMENTS

We present the list of the species of *Conus* and the distribution area of all the species described from Angola, which was published in the previous work (ROLÁN AND RÖCKEL, 2000) with the addition of the species here described.

ACKNOWLEDGEMENTS

The authors thank Anabela Fernandes, daughter of the late Francisco Fer-

nandes, for her help in sending material for study, M. Filmer for critical revision of the manuscript. Also Jesús S. Troncoso of the Departamento de Biología y Ecología of the University of Vigo, is thanked for the use of the digital camera of this department for the colour photographs.

This work has been partially supported by a grant from the XUNTA DE GALICIA PGIDTOOPXI30121PR and with the help of the PARSYST PROJECT.

BIBLIOGRAPHY

ROLÁN, E. AND RÖCKEL, D., 2000. The endemic *Conus* of Angola. *Argonauta*, 13(2): 5-44.